

AMENDMENTS TO THE CLAIMS:

1. (currently amended) A fiber laser, comprising:

A linear section of fiber including,

A cladding formed from a phosphate glass host;

and

5 A core formed from a similar phosphate glass host
co-doped ~~doped~~ with 0.5-5.0 wt.% Er₂O₃ ~~erbium-ions~~ and at
~~least~~ 0.5-30 wt. % Yb₂O₃ ~~ytterbium-ions~~;

At least one wavelength-selective reflector having a
characteristic linewidth, said reflector at least partially
10 defining an optical resonant cavity of 5cm or less that
includes the section of fiber; and

A source of pump radiation that illuminates the fiber
to excite erbium and ytterbium ions in the Er₂O₃ and Yb₂O₃,
respectively, and provide gain;

15 the length of said cavity producing a mode spacing
that is sufficiently wide with respect ~~comparable~~ to the
wavelength-selective reflector's linewidth so that the
erbium lases at a single longitudinal mode and said fiber
outputs a single-mode signal.

2. (currently amended) The fiber laser of claim 1,
wherein the source of pump radiation comprises a single-
mode laser that illuminates the fiber core, said core being
doped with 0.5-15.0 wt. % ~~ytterbium-ions~~ Yb₂O₃.

3. (currently amended) The fiber laser of claim 2,
wherein the phosphate glass hosts include the following
ingredients by weight percentages,

P₂O₅ from 30 to 80 percent,

5 ~~Yb₂O₃ from 0.5 to 5 percent,~~

~~Er₂O₃ from 0.5 to 5 percent,~~
L₂O₃ from 5 to 30 percent, and
MO from 5 to 30 percent,
wherein the sum of the weight percentages of ~~Yb₂O₃ and Er₂O₃~~
10 ~~is 2.5 % or greater,~~ MO is selected from BaO, BeO, MgO,
SrO, CaO, ZnO, PbO and mixtures thereof, and L₂O₃ is
selected from Al₂O₃, B₂O₃, Y₂O₃, La₂O₃, and mixtures thereof;
and
wherein the core is co-doped with Er₂O₃ from 0.5 to 5 wt. %
15 and Yb₂O₃ from 0.5 to 5 wt. % with a sum of 2.5 to 10 wt. %.

4. (original) The fiber laser of claim 2, wherein the single-mode pump laser is rated at less than 250mW, said fiber laser providing more than 50mW of output power in the single-mode signal.

5. (currently amended) The fiber laser of claim 1, wherein the source of pump radiation comprises a multi-mode laser that illuminates the fiber cladding, said core being doped with 5-30 wt % ~~ytterbium ions~~ Yb₂O₃.

6. (currently amended) The fiber laser of claim 5, wherein the phosphate glass hosts include the following ingredients by weight percentages,
P₂O₅ from 30 to 80 percent,
5 ~~Yb₂O₃ from 5 to 30 percent,~~
~~Er₂O₃ from 0.5 to 5 percent,~~
L₂O₃ from 5 to 30 percent, and
MO from 5 to 30 percent,
wherein the sum of the weight percentages of ~~Yb₂O₃ and Er₂O₃~~
10 ~~is 10.0 % or greater,~~ MO is selected from BaO, BeO, MgO,

SrO, CaO, ZnO, PbO and mixtures thereof, and L_2O_3 is selected from Al_2O_3 , B_2O_3 , Y_2O_3 , La_2O_3 , and mixtures thereof, and

15 wherein the core is co-doped with Er_2O_3 from 0.5 to 5 weight percent and Yb_2O_3 from 5 to 30 weight percent with a sum of 10 to 35 wt. %.

7. (original) The fiber laser of claim 5, wherein the multi-mode pump laser is rated at less than 1.5 W, said fiber laser providing more than 50 mW of output power in the single-mode signal.

8. (original) The fiber laser of claim 1, wherein the erbium and ytterbium co-doped phosphate glass fiber provides a slope efficiency of at least 30 %.

9. (original) The fiber laser of claim 1, wherein the fiber core has a rectangular cross-section, which imparts a single polarization on the single-mode signal.

10. (original) The fiber laser of claim 1, further comprising a silica telecomm fiber, said phosphate fiber being fusion spliced to said silica telecomm fiber.

11. (original) The fiber laser of claim 10, wherein the wavelength-selective reflector is formed on said telecomm fiber.

12. (original) The fiber laser of claim 1, wherein the fiber exhibits a gain of greater than 1 dB over a range of wavelengths from 1530 nm to 1565 nm.

13. (original) The fiber laser of claim 12, wherein the fiber exhibits a peak gain of greater than 5 dB.

14. (currently amended) A fiber laser, comprising:

A ~~linear~~ section of fiber including

A cladding formed from a phosphate glass host;

and

5 A core formed from a similar phosphate glass host
~~doped~~ co-doped with 0.5-5.0 wt. % Er₂O₃ ~~erbium ions~~ and 5-30
wt. % ~~ytterbium ions~~ Yb₂O₃;

At least one wavelength-selective reflector having a characteristic linewidth, said reflector at least partially
10 defining an optical resonant cavity of 5 cm or less that includes the section of fiber; and

A multi-mode laser that illuminates the fiber cladding to stimulate erbium and ytterbium ions in the Er₂O₃ and Yb₂O₃ co-doped core and provide gain;

15 the length of said cavity producing a mode spacing that is sufficiently wide with respect to the wavelength-selective reflector's linewidth that the erbium lases at a single longitudinal mode and said fiber outputs a single-mode signal.

15. (currently amended) The fiber laser of claim 14, wherein the phosphate glass hosts include the following ingredients by weight percentages,

P₂O₅ from 30 to 80 percent,

5 ~~Yb₂O₃ from 5 to 30 percent,~~

~~Er₂O₃ from 0.5 to 5 percent,~~

L₂O₃ from 5 to 30 percent,

MO from 5 to 30 percent,

wherein the ~~sum of the weight percentages of Yb_2O_3 and Er_2O_3~~
10 ~~is 10.0 % or greater~~, MO is selected from BaO, BeO, MgO,
SrO, CaO, ZnO, PbO and mixtures thereof, and L_2O_3 is
selected from Al_2O_3 , B_2O_3 , Y_2O_3 , La_2O_3 , and mixtures thereof,
and
wherein the core is co-doped with Er_2O_3 from 0.5 to 5 weight
15 percent and Yb_2O_3 from 5 to 30 weight percent with a sum of
10 to 35 wt. %.

16. (original) The fiber laser of claim 15, wherein the
multi-mode pump laser is rated at less than 1.5 W, said
fiber laser providing more than 50 mW of output power in
the single-mode signal.

17. (currently amended) A fiber laser, comprising:

A ~~linear~~ section of fiber including

A cladding formed from a phosphate glass host;

and

5 A core formed from the phosphate glass host doped
with 0.5 - 5.0 wt. % Er_2O_3 ~~erbium ions~~ and at least 0.5-30
wt. % Yb_2O_3 ~~ytterbium ions~~;

A First and second telecom fiber fibers formed from a
silica glass and fusion spliced to opposite ends of the
10 linear section of fiber;

~~At least one~~ First and second wavelength-selective
~~reflector~~ reflectors formed on said first and second
telecom fiber fibers and having a characteristic linewidth,
said ~~reflector~~ reflectors ~~partially~~ defining an optical
15 resonant cavity of 5cm or less that includes the section of
fiber; and

A source of pump radiation that illuminates the fiber to excite erbium and ytterbium ions in the co-doped Er_2O_3 and Yb_2O_3 core and provide gain;

20 the length of said cavity producing a mode spacing that is sufficiently wide with respect to the wavelength-selective reflector's linewidth that the erbium lases at a single longitudinal mode and said section of fiber outputs a single-mode signal into said telecom fiber.

18. (currently amended) The fiber laser of claim 17, wherein the source of pump radiation comprises a single-mode laser that illuminates the fiber core, said core being doped with 0.5-15.0 wt. % Yb_2O_3 ~~ytterbium ions~~.

19. (currently amended) The fiber laser of claim 18, wherein the phosphate glass hosts include the following ingredients by weight percentages,

P_2O_5 from 30 to 80 percent,

5 ~~Yb_2O_3 from 0.5 to 5 percent,~~

~~Er_2O_3 from 0.5 to 5 percent,~~

L_2O_3 from 5 to 30 percent,

MO from 5 to 30 percent,

wherein ~~the sum of the weight percentages of Yb_2O_3 and Er_2O_3~~
10 ~~is 2.5 % or greater,~~ MO is selected from BaO , BeO , MgO , SrO , CaO , ZnO , PbO and mixtures thereof, and L_2O_3 is selected from Al_2O_3 , B_2O_3 , Y_2O_3 , La_2O_3 , and mixtures thereof;
and

wherein the core is co-doped with Er_2O_3 from 0.5 to 5 wt. % and Yb_2O_3 from 0.5 to 5 wt. % with a sum of 2.5 to 10 wt. %.

20. (original) The fiber laser of claim 18, wherein the

single-mode pump laser is rated at less than 250mW, said fiber laser providing more than 50mW of output power in the single-mode signal.

21. (currently amended) The fiber laser of claim 17, wherein the source of pump radiation comprises a multi-mode laser that illuminates the fiber cladding, said core being doped with 5-30 wt. % Yb₂O₃ ~~ytterbium ions~~.

22. (currently amended) The fiber laser of claim 21, wherein the phosphate glass hosts include the following ingredients by weight percentages,

P₂O₅ from 30 to 80 percent,

5 ~~Yb₂O₃ from 5 to 30 percent,~~

~~Er₂O₃ from 0.5 to 5 percent,~~

L₂O₃ from 5 to 30 percent,

MO from 5 to 30 percent,

10 ~~wherein the sum of the weight percentages of Yb₂O₃ and Er₂O₃ is 10.0 % or greater,~~ MO is selected from BaO, BeO, MgO, SrO, CaO, ZnO, PbO and mixtures thereof, and L₂O₃ is selected from Al₂O₃, B₂O₃, Y₂O₃, La₂O₃, and mixtures thereof; and

15 wherein the core is co-doped with Er₂O₃ from 0.5 to 5 weight percent and Yb₂O₃ from 5 to 30 weight percent with a sum of 10 to 35 wt. %.

23. (currently amended) The fiber laser of claim 21, wherein the multi-mode pump laser is rated at less than 1.5 W, said fiber laser providing more than 50 mW of output power in the single-mode signal.

24. (new claim) A fiber laser, comprising:

A section of fiber including,

A cladding formed from a phosphate glass host including P_2O_5 from 30 to 80 wt. %, Li_2O_3 from 5 to 30 wt. %, MO from 5 to 30 wt. %, MO is selected from BaO, BeO, MgO, SrO, CaO, ZnO, PbO and mixtures thereof, and Li_2O_3 is selected from Al_2O_3 , B_2O_3 , Y_2O_3 , La_2O_3 , and mixtures thereof; and

A core formed from the phosphate glass host co-doped with 0.5-5.0 wt.% Er_2O_3 and 0.5-30 wt. % Yb_2O_3 , the sum of the weight percentages of Yb_2O_3 and Er_2O_3 being 2.5 to 35 wt. %;

At least one wavelength-selective reflector having a characteristic linewidth, said reflector at least partially defining an optical resonant cavity of 5cm or less that includes the section of fiber; and

A source of pump radiation that illuminates the fiber to excite erbium and ytterbium ions in the Er_2O_3 and Yb_2O_3 co-doped core and provide gain;

the length of said cavity producing a mode spacing that is sufficiently wide with respect to the wavelength-selective reflector's linewidth so that the erbium lases at a single longitudinal mode and said fiber outputs a single-mode signal.

25. (new claim) The fiber laser of claim 24, wherein the core is co-doped with 0.5-5 wt. Er_2O_3 and 0.5-15 wt. % Yb_2O_3 .

26. (new claim) The fiber laser of claim 24, wherein the core is co-doped with 0.5-5 wt. Er_2O_3 and 0.5-5 wt. % Yb_2O_3 .

27. (new claim) The fiber laser of claim 24, further comprising:

A first telecom fiber formed of silica glass and fusion spliced to the linear section of fiber, said wavelength-selective reflector being formed on said telecom fiber.

28. (new claim) The fiber laser of claim 27, further comprising:

A second telecom fiber formed of silica glass and fusion spliced to the other end of the linear section of fiber; and

A grating formed on said second telecom fiber.

29. (new claim) A fiber laser, comprising:

A section of fiber including,

A cladding formed from a phosphate glass host including P_2O_5 from 30 to 80 wt. %, L_2O_3 from 5 to 30 wt. %, MO from 5 to 30 wt. %, MO is selected from BaO, BeO, MgO, SrO, CaO, ZnO, PbO and mixtures thereof, and L_2O_3 is selected from Al_2O_3 , B_2O_3 , Y_2O_3 , La_2O_3 , and mixtures thereof; and

A core formed from the phosphate glass host co-doped with 0.5-5.0 wt.% Er_2O_3 and 0.5-30 wt. % Yb_2O_3 , the sum of the weight percentages of Yb_2O_3 and Er_2O_3 being 2.5 to 35 wt. %;

First and second telecom fibers formed of silica glass fusion spliced to opposite ends of the linear section of fiber;

First and second fiber bragg gratings (FBGs) formed on said first and second telecom fibers to define an optical resonant cavity of 5cm or less; and

20 A source of pump radiation that illuminates the fiber to excite erbium and ytterbium ions in the Er_2O_3 and Yb_2O_3 co-doped core and provide gain;

the length of said cavity producing a mode spacing that is comparable to or larger than the first FBG's linewidth so that the erbium lases at a single longitudinal mode and said fiber outputs a single longitudinal mode
25 signal.

30. (new claim) The fiber laser of claim 29, wherein the first telecom fiber is a polarization maintaining fiber.

31. (new claim) The fiber laser of claim 29, wherein the core is co-doped with 0.5-5 wt. Er_2O_3 and 0.5-15 wt. % Yb_2O_3 .

32. (new claim) The fiber laser of claim 29, wherein the core is co-doped with 0.5-5 wt. Er_2O_3 and 0.5-5 wt. % Yb_2O_3 .